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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/548,407

09/08/2005

Chiaki Yokoyama

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06/25/2008

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EXAMINER

WANG, CHUN CHENG

ART UNIT

PAPER NUMBER

4171

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/548,407	<b>Applicant(s)</b> YOKOYAMA ET AL.	
	<b>Examiner</b> Chun-Cheng Wang	<b>Art Unit</b> 4171	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☒ Claim(s) 1-11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/03/2005</u> . | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities: The specification contains inconsistent meaning for the term ‘...ratio a/b...’ (Disclosure of the invention, page 4) which is referring to molar ratio, while in the Example section ‘ratio a/b’ is meant for mMole/mL.

Appropriate correction is required.

### ***Claim Objections***

2. Claims 1-11 are objected to because of the following informalities: Claims contain the term ‘...A method for concentration of ...’ which does not clearly describing the purpose of the method.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 3, 6 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term ‘ordinary temperature’ is not described in specification and it is not clear what the temperature range is.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1 are rejected under 35 U.S.C. 102(b) as being anticipated by Boudreau et al.

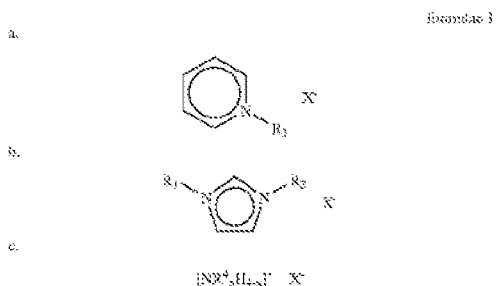
(WO 02/34863 A1).

7. Regarding claim 1: Applicants recite a method for concentration of fine particles dispersed in a dispersion comprising, adding an ionic liquid, which does not dissolve substantially a dispersing medium of said dispersion, to said dispersion containing fine particles, transferring said fine particles from said dispersion to said ionic liquid and concentrating said fine particles into said ionic liquid.

8. Boudreau et al. disclose methods for removing mercaptans from hydrocarbons streams.

The methods use basic metal salts which react with mercaptans to form mercaptides. The metal salt are dissolved or suspended in ionic liquids. After the mercaptides are absorbed into the ionic liquid, the demercaptanized hydrocarbon stream can be removed, by distillation, decantation or gravity separation. Then the mercaptides can be oxidized to form disulfides which can be readily removed from the ionic liquid (Abstract). The ionic liquid is not soluble in non-polar hydrocarbons (page 5, line 19.)

9. Regarding claims 3-5: Applicants further recite the ionic liquid is an ionic liquid which is liquid at (ordinary) temperature (claim 3), wherein the ionic liquid is an organic ionic liquid (claim 4) and the organic ionic liquid is selected from the group consisting of compounds represented by following formulae 1,



wherein,  $R_3$  and  $R^4$  are an alkyl group of carbon number 1-7,  $n$  is an integer of 1-3,  $R_1$  is an alkyl group which can possess a substitution group of carbon number 1-7,  $X^-$  is selected from the group consisting of  $PF_6^-$ ,  $BF_4^-$ ,  $NO_3^-$ ,  $(CF_3SO_3)_2N^-$ , TFSI $^-$ ,  $Cl^-$  and  $SO_3H^-$  (claim 5.)

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10. Boudreau et al. disclose ionic liquids are organic compounds that are liquid at room temperature (page 5, line 17). Boudreau et al. further disclose  $\text{bmim}^+ \text{BF}_4^-$  and  $\text{bmim}^+ \text{PF}_6^-$ , where  $\text{bmim}$  = 1-butyl-3-methylimidazolium, that are liquids at room temperature (page 13, Table 1.)

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

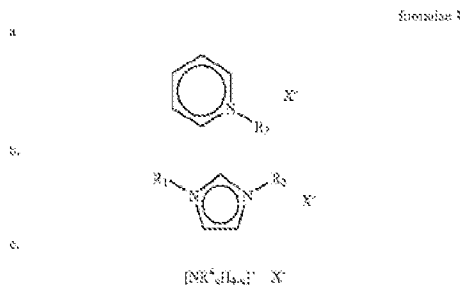
12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. Claims 2 and 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boudreau et al. (WO 02/34863 A1.)

14. Regarding claims 2 and 9-11: Applicants further recite the amount of the ionic liquid  $b$  mM to be added to 10 mL of the dispersion containing said fine particles by a mM dispersing concentration is in the range so as the ratio  $a/b$  to be at least 0.05 (claim 2), wherein the ionic liquid is an ionic liquid which is liquid at ordinary temperature (claim 9), wherein the ionic liquid is an organic ionic liquid (claim 10), wherein the ionic liquid is an organic ionic liquid and wherein the organic ionic liquid is selected from the group consisting of compounds represented by following formulae 1,

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wherein,  $\text{R}_3$  and  $\text{R}^4$  are an alkyl group of carbon number 1-7,  $n$  is an integer of 1-3,  $\text{R}_1$  is an alkyl group which can possess a substitution group of carbon number 1-7,  $\text{X}^-$  is selected from the group consisting of  $\text{PF}_6^-$ ,  $\text{BF}_4^-$ ,  $\text{NO}_3^-$ ,  $(\text{CF}_3\text{SO}_3)_2\text{N}^-$ ,  $\text{TFSI}^-$ ,  $\text{Cl}^-$  and  $\text{SO}_3\text{H}^-$  (claim 11.)

15. Boudreau et al. disclose ionic liquids are organic compounds that are liquid at room temperature (page 5, line 17). Boudreau et al. further disclose  $\text{bmim}^+ \text{BF}_4^-$  and  $\text{bmim}^+ \text{PF}_6^-$ , where  $\text{bmim}$  = 1-butyl-3-methylimidazolium, that are liquids at room temperature (page 13, Table 1.)

Boudreau et al. are **silent** on the ratio  $a/b$  to be at least 0.05.

16. Regarding claims 6-8: Applicants further recite the ionic liquid to be added to the dispersion containing fine particles is an ionic liquid which is liquid at ordinary temperature and the amount of the ionic liquid  $b$  mM to be added to 10 mL of the dispersion containing said fine particles by  $a$  mM dispersing concentration is in the range so as the ratio  $a/b$  to be at least 0.05 (claim 6), wherein the ionic liquid is an organic ionic liquid (claim 7), wherein the organic ionic liquid is selected from the group consisting of compounds represented by above mentioned formulae 1 (claim 8.)

17. Boudreau et al. disclose ionic liquids are organic compounds that are liquid at room temperature (page 5, line 17). Boudreau et al. further disclose neutral ionic liquids  $\text{bmim}^+ \text{BF}_4^-$  and  $\text{bmim}^+ \text{PF}_6^-$ , where  $\text{bmim}$  = 1-butyl-3-methylimidazolium, that are liquids at room temperature (page 13, Table 1.)

Boudreau et al. are **silent** on the ratio  $a/b$  to be at least 0.05.

It is clear that Boudreau et al. teach all the limitations in claims 2 and 6-11 except that they are silent on the  $a/b$  ratio.

The molar ratio of a/b is the ionic liquid absorption efficiency indicator for each pair of particle/ionic liquid, the higher the number the better the ionic liquid performs, i.e. less amount to remove or extract the particles in the dispersion.

The caselaw has held that “Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955.) Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to achieve the claimed ratio a/b by routine optimization and thereby obtain the present invention.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chun-Cheng Wang whose telephone number is (571)270-5459. The examiner can normally be reached on Monday to Friday w/alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ling-Siu Choi/  
Primary Examiner, Art Unit 1796

Chun-Cheng Wang  
Examiner, Art Unit 4171

/ccw/